INVESTIGATIONS OF DUST IN THE UPPER ATMOSPHERE BY OPTICAL RADAR

SEMIANNUAL REPORT

on

NATIONAL AERONAUTICS AND SPACE ADMISTRATION

Grant NGR-22-009-(114)

covering the period January 1-June 30, 1966

July 1, 1966

Submitted by: Giorgio Fiocco

Massachusetts Institute of Technology
Research Laboratory of Electronics
Cambridge, Massachusetts

Semiannual Report on NASA Grant NGR-22-009-(114)

This grant and another grant from the National Aeronautics and Space Administration have supported several activities in the field of optical radar and atmospheric optics.

The following activities have been principally supported by this grant.

1. A study of the optical radar cross sections of Mie spheres of complex refractive index. Care has also been taken of different size distributions. This study, involving a substantial amount of computation (mainly funded through Departmental sources), is now nearing completion.

2. A study of the production of ionization by micrometeorites, involving neutral-neutral collisions. Computations are being checked and a manuscript is being prepared for publication.

3. Analyses of optical radar data accumulated during the years 1964 and 1965. These analyses involve digitizing oscilloscopic traces with a semiautomatic Bensou-Lehner digital converter and successive reduction by computer.

4. Modifications to our optical radar, including a more efficient coding system.

This grant has also aided these other activities.

5. A study of the stratospheric aerosol and its correlation with ozone has been completed. Preliminary results were presented at the American Geophysical Union in Washington, D.C., in April 1966, and a detailed manuscript is being prepared. Portions of this study have formed part of the requirements for

the doctoral dissertation of Gerald Grams, which has now been successfully completed.

6. A study of noctilucent clouds is being carried out in Norway with the optical radar.

7. As part of the study on noctilucent clouds an OH airglow meter has been constructed. It is hoped that simultaneous measurements of OH rotational-vibrational spectra with optical radar observations will help in correlating the presence of the clouds with mesospheric OH and mesospheric temperature.

Results of our past work on noctilucent clouds were presented at the International Symposium on Noctilucent Clouds, at Tallinn, Estonia, U.S.S.R., in March 1966.